

CLAIMS:

1. A duct connector comprising:  
a substantially rectangular passage disposed at a first end of the duct connector and  
5 through which air flow enters the duct connector;  
a substantially round passage disposed at a second end of the duct connector and  
through which air flow exits the duct connector; and  
an intermediate passage extending between the rectangular passage and the round  
passage and including:  
10 at least two side walls disposed substantially opposite each other;  
at least two end walls disposed substantially opposite each other; and  
substantially continuous curved convex transitional surfaces  
interconnecting each side wall to adjacent end walls.
- 15 2. The duct connector of claim 1, further comprising a flap rotatably mounted  
within the duct connector adjacent the intersection of the intermediate passage and round  
passage.
- 20 3. The duct connector of claim 1, wherein the curvature of the transitional  
surface is tangential to the adjacent side wall and tangential to the adjacent end wall.
4. A duct connector comprising:  
a substantially rectangular passage disposed at a first end of the duct connector and  
through which air flow enters the duct connector;  
25 a substantially round passage disposed at a second end of the duct connector and  
through which air flow exits the duct connector; and  
an intermediate passage extending between the rectangular passage and the round  
passage and including:  
30 at least two side walls disposed substantially opposite each other; and  
a single substantially smooth transitional surface interconnecting each side  
wall with an adjacent end wall.

5. The duct connector of claim 4, further comprising a flap rotatably mounted within the duct connector adjacent an intersection of the intermediate passage and the substantially round passage.

5 6. A duct connector comprising:

a substantially rectangular passage disposed at a first end of the duct connector and through which air flow enters the duct connector;

a substantially round passage disposed at a second end of the duct connector and through which air flow exits the duct connector; and

10 an intermediate passage extending between the rectangular passage and the round passage and including:

at least two side walls disposed substantially opposite each other; and

15 a non-faceted transitional surface interconnecting each side wall to adjacent end walls to surround an axis through the duct connector.

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7. The duct connector of claim 6, wherein each transitional surface is tangential to a side wall and an adjacent end wall.

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8. A duct connector comprising:

a substantially rectangular passage disposed at one end of the duct connector;

a substantially round passage disposed at the opposite end of the duct connector;

and

an intermediate passage extending between the rectangular passage and the round passage and including:

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at least two side walls disposed substantially opposite each other;

at least two end walls disposed substantially opposite each other; and

curved transitional surfaces interconnecting each side wall to an adjacent end wall, each transitional surface being tangential to an adjacent side wall and end wall.

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9. The duct connector of claim 8, further comprising a flap rotatably mounted within the duct connector adjacent an intersection of the intermediate passage and the round passage.

10. A duct connector, comprising:  
a first end having a substantially rectangular passage;  
a second end having a rotund passage in fluid communication with the  
substantially rectangular passage; and  
5 at least one wall defining a transitional passage between and connecting the  
substantially rectangular passage and the rotund passage, the transitional passage being  
substantially free from steps and sharp corners.

11. The duct connector of claim 10, wherein the transitional passage is at least  
10 partially defined by opposing substantially flat walls joined by opposing curved walls.

12. The duct connector of claim 11, wherein the curved walls are concave in  
relation to fluid flow.

15 13. The duct connector of claim 11, wherein each flat wall is joined to adjacent  
curved walls with curved transitional surfaces

14. The duct connector of claim 10, wherein the transitional passage is at least  
partially defined by walls surrounding a fluid flow path through the duct connector.

20 15. The duct connector of claim 14, wherein the walls are connected by smooth  
transitional surfaces

16. The duct connector of claim 10, further comprising a flap disposed within  
25 the duct connector.

17. The duct connector of claim 16, wherein the flap is rotatably mounted  
within the duct connector.

30 18. The duct connector of claim 10, wherein the flap is mounted between the  
transitional passage and the rotund passage.

19. The duct connector of claim 10, wherein the transitional passage at outlet has smaller cross-sectional shape than the transitional passage at inlet.

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20. A duct connector, comprising:  
an inlet;  
an outlet in fluid communication with the inlet;  
one of the inlet and outlet having a substantially rectangular inner shape, another of  
5 the inlet and outlet having a rotund shape, the inlet and outlet at least partially defining a  
fluid path through the duct connector; and

a plurality of walls connecting the inlet and the outlet and circumscribing the fluid  
path to define a plurality of interfaces between adjacent pairs of the plurality of walls, each  
interface having a rounded shape and defining a smooth transitional surface between  
adjacent walls.

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21. The duct connector of claim 20, wherein the plurality of walls includes  
opposing flat walls and opposing curved walls presenting concave surfaces to a fluid path  
through the duct connector.

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22. The duct connector of claim 20, further comprising a flap located within the  
duct connector.

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23. The duct connector of claim 22, wherein the flap is rotatably mounted

within the duct connector.

24. The duct connector of claim 22, wherein the flap is mounted between the  
plurality of walls and the outlet.

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25. The duct connector of claim 20, wherein the inlet and outlet have respective  
cross-sectional areas, the cross-sectional area of the outlet being smaller than the cross-  
sectional area of the inlet.

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26. A method of directing fluid flow from a rectangular inlet to a rotund outlet  
of a duct connector having a central axis, the method comprising:

receiving fluid through the rectangular inlet of the duct connector;  
passing fluid flow past a plurality of walls surrounding the central axis and past a  
plurality of rounded transitional surfaces connecting the plurality of walls;

diverting fluid flow in the connector toward the central axis with the plurality of walls and the plurality of rounded transitional surfaces;

funneling fluid flow from the plurality of walls and the plurality of rounded transitional surfaces to the rotund outlet; and

5       passing fluid flow through the rotund outlet.

27.      The method of claim 26, further comprising:

opening a flap located within the duct connector; and

passing fluid flow past the flap.

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28.      The duct connector of claim 27, wherein the flap is located between the plurality of walls and the rotund outlet.

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29.      The duct connector of claim 26, further comprising compressing fluid flow

by funneling fluid flow in a direction toward the rotund outlet.